

TWO NEW SPECIES OF THE GENUS *CLUNIO*
(DIPTERA: CHIRONOMIDAE)

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Abstract.—*Clunio virginianus* n. sp. from the Virgin Islands and *Clunio chilensis* n. sp. from Mornington Island, Chile are described, figured, and compared with related species.

Intertidal midges of the genus *Clunio* Haliday are found in all regions of the world, with 18 described species (Hashimoto, 1976). These include the Neotropical species *Clunio marshalli* Stone and Wirth (1947), *C. schmitti* Stone and Wirth (1947), *C. brasiliensis* Oliveira (1950), *C. fuscipennis* Wirth (1952), and *C. californiensis* Hashimoto (1974). Through the courtesy of W. W. Wirth, Systematic Entomology Laboratory, Agricultural Research Service, Washington, D.C., I have been able to borrow and study two collections representing two previously undescribed species.

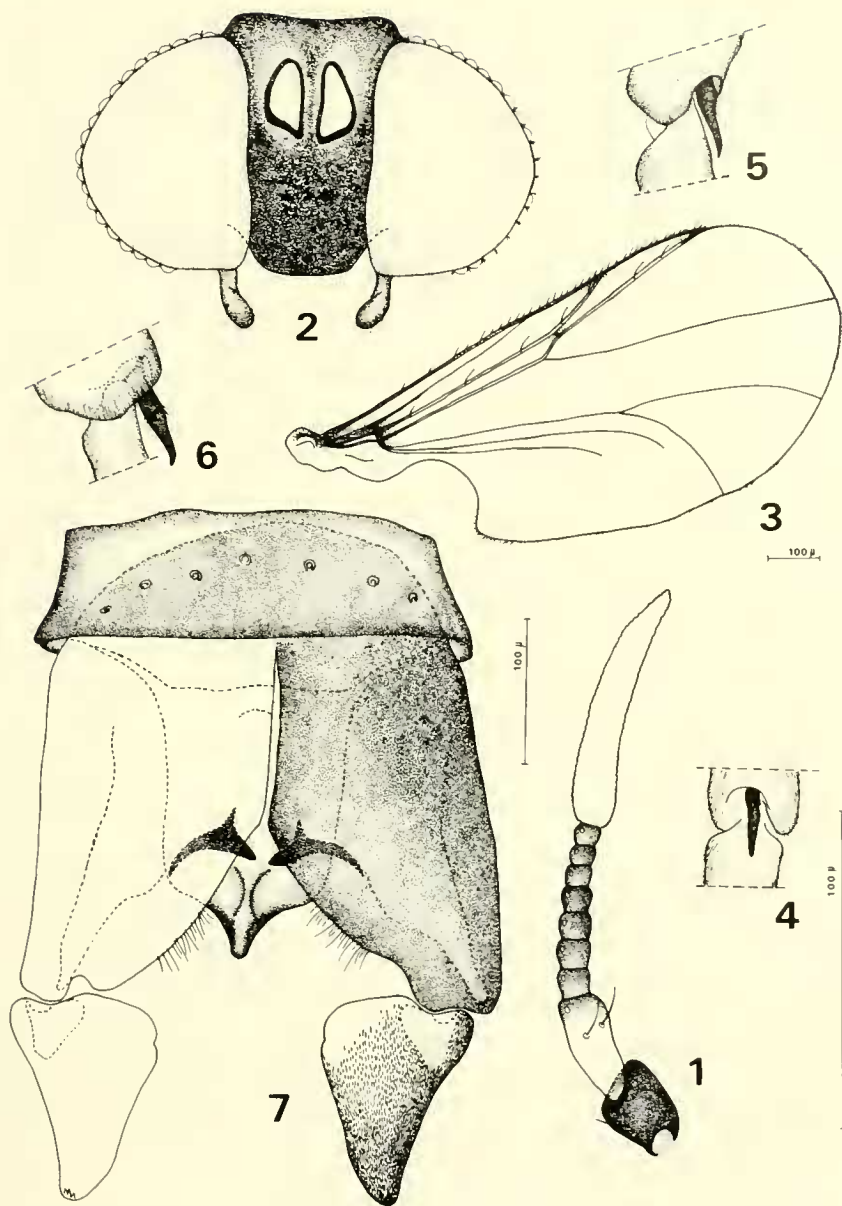
Holotypes are deposited in the U.S. National Museum, Washington, D.C.; paratypes as available will be deposited in the USNM, the Instituto de Limnologia, Universidad Nacional de La Plata, and the Museu de Zoologia, Universidade de São Paulo, Brazil.

The terms and methods of measurement used in this paper follow Saether (1971, 1980) and Strenzke (1959); the leg and hypopygium ratios follow Schlee (1966). Measurements are given as range, followed by mean and sample size.

Clunio virginianus NEW SPECIES

Figs. 1-7, 18, 20

Male.—Wing length 1 mm (10); width 0.44-0.48, 0.46 mm (8). Coloration (specimens mounted in Canada balsam) brownish. Head: clypeus and vertex dark brownish, maxillary palpus light brownish, eyes black. Antenna: (Fig. 1) pedicel dark brownish, flagellum yellowish white, darkening on distal 1/3 of 1st flagellomere and the 7 intermediate ones. Thorax: scutum dark brownish; scutellum, anepisternum II and preepisternum II light brownish. Wings grayish white, veins grayish, well defined. Legs yellowish white, except coxae, trochanters, and articulations of femora and tibiae light brownish; tibial spurs and claws blackish. Abdomen and hypopygium brownish. Head (Fig. 2): Interocular width 87 μ m, total width 216-238, 223 μ m (6); ocular height 130-151, 137 μ m (4). Antenna with 1-2 setae on pedicel and 2 setae on 1st flagellomere. Antennal proportions 10:19:4:4:4:3:3:3:38. A.R. (11/7-10) 2.46-307, 2.82 (8) and (11/3-10) 0.71-0.88, 0.84 (8). Length of maxillary palpus 30-45, 36 μ m (6); width: 15-20, 16 μ m (6). Clypeus/pedicel



Figs. 1-7. *Clunio virginianus*. 1, Antenna. 2, Head, frontal view. 3, Wing. 4-6, Tibial spurs of fore, mid, and hindlegs, respectively. 7, Hypopygium, ventral view.

ratio 1.66-2.0 1.83 (7). *Thorax*: Scutum with 3-5, 4 (10) dorsolateral setae from light colored ocellate spots and 2-3 prealar setae. Scutellum with 6-8, 7 (8) setae. Length of all these setae about 45 μm. *Wing* (Fig. 3): V.R. = 1.31 (10). Membrane and squama bare. R + R₁ with 5 setae, R₄₊₅ with 2-3 setae; R₁ about 1/3 of R₄₊₅ length, the latter nearly straight, ending as does C, before reaching wing apex; R₄₊₅ almost the same length as R; M straight, not upcurved at distal end, and

together with Cu_1 and Cu_2 clearly reaching wing margin; fCu not narrow at its base; Cu_2 slightly curved; A_1 ending beyond fCu, A_2 just reaching fCu. *Legs*: Coxa and trochanter each distally with tuft of 4–5 setae on foreleg, each with 2 moderately long setae on midleg, and each with a very small seta on hindleg. Femora and tibiae of all legs with sparse rows of short setae. First tarsomere $4\times$ as long as broad on foreleg and $3\times$ as long as broad on mid and hindlegs. Length of tibial spurs: on foreleg 15–20, 18 μm (5) (Fig. 4); midleg 20 μm (5) (Fig. 5); hindleg 25 μm (5) (Fig. 6). Lengths (μm) and proportions of legs ($n = 5$): Leg I: Fe 281 (260–303); Ti 399 (368–433); Ta1 113 (104–103); Ta2 34 (30–35); Ta3 29 (26–35); Ta4 29 (26–35); Ta5 44 (43–44); L.R. 0.28 (0.26–0.30); B.V. 5.83 (5.14–6.66); S.V. 6.01 (5.66–6.46). Leg II: Fe 349 (303–390); Ti 357 (336–390); Ta1 55 (48–65); Ta2 29 (23–30); Ta3 25 (22–26); Ta4 25 (23–26); Ta5 41 (35–43); L.R. 0.15 (0.13–0.16); B.V. 6.37 (5.60–7.13); S.V. 12.95 (11.8–15.33). Leg III: Fe 378 (360–411); Ti 375 (359–407); Ta1 67 (65–70); Ta2 30 (26–35); Ta3 50 (43–58); Ta4 24 (22–26); Ta5 41 (35–43); L.R. 0.18 (0.17–0.18); B.V. 5.65 (5.23–6.03); S.V. 11.27 (10.28–11.85). *Abdomen*: Each tergite with transverse row of 6–8 setae. *Hypopygium* (Fig. 7): Gonocoxite length 336 μm (9), gonostylus length 139 μm (9). H.R. = 2.41 (9). Gonocoxites fused on basal $\frac{1}{3}$, each dorsal inner margin showing a concave surface in contact with parameres. The latter heavily sclerotized, slightly curved, and with a proximal projection. Ninth tergite consisting of a subquadrate plate ending conically and with dense pubescence, not reaching level of tips of gonocoxites.

Female and immature stages.—Unknown.

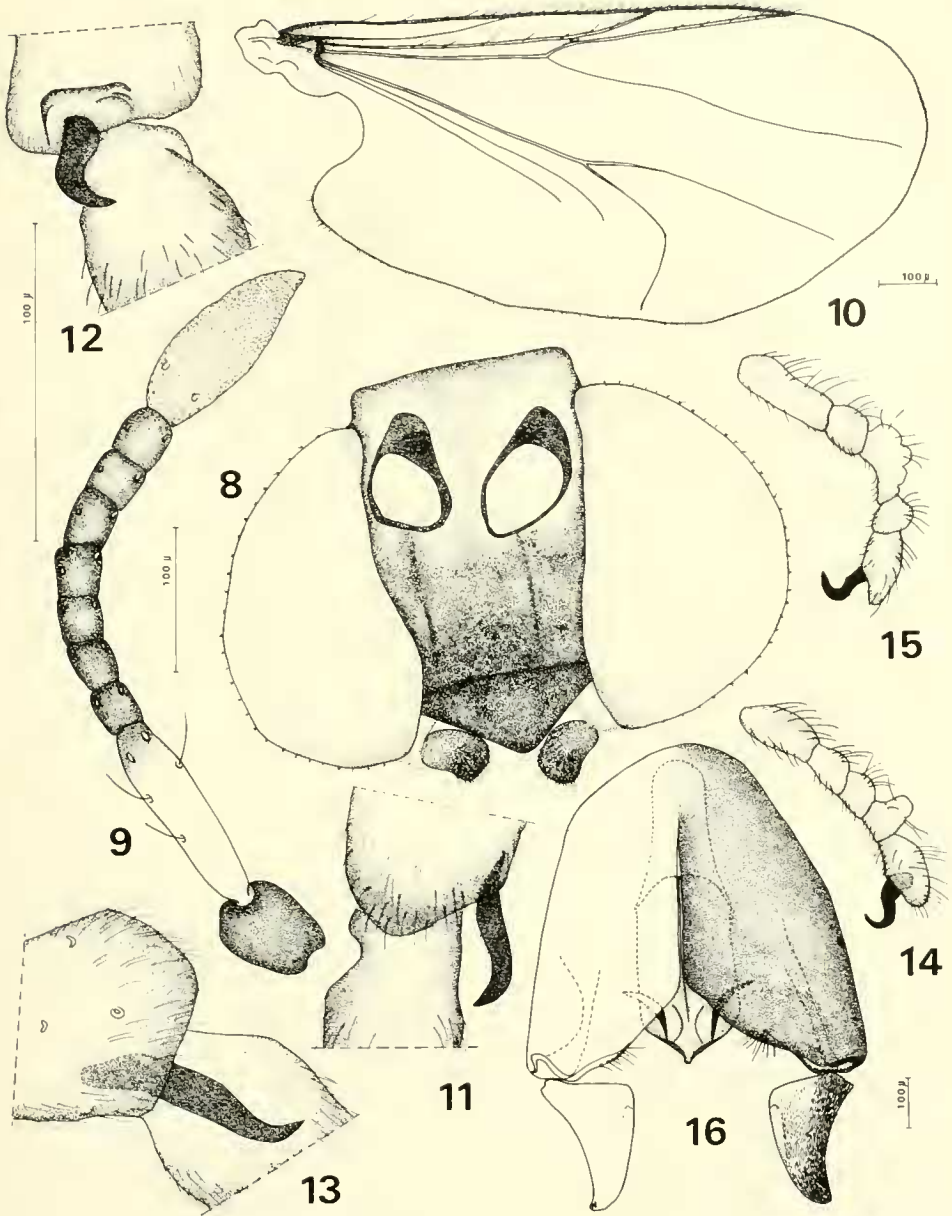
Material examined.—Holotype δ , St. John, U.S. Virgin Islands, Lesser Antilles, Nov. 1959, R. W. Williams col. (deposited in USNM). Paratypes, 9 δ , same data as holotype.

Discussion.—This new species closely resembles *Clunio marshalli* Stone and Wirth (1947), described from Biscayne Channel, Dade County, Florida and also recorded from the Virgin Islands. *Clunio virginianus* differs in having a high antennal ratio with the last flagellomere longer and more tapering than in *marshalli*. In *C. marshalli* the pedicel bears two setae, wing veins M, Cu_1 , and Cu_2 do not distinctly reach the wing margin, wing vein M is distinctly upcurved distally, A_1 and A_2 are indistinct, tarsomere 1 is two times as long as broad on foreleg and three times as long as broad on mid and hindlegs. The U-shaped sclerotized ridge on the 8th tergite is rounded and basally opened in *C. marshalli* (Fig. 17), while it is subquadrate and with parallel sides in *virginianus* (Fig. 18).

Clunio chilensis NEW SPECIES

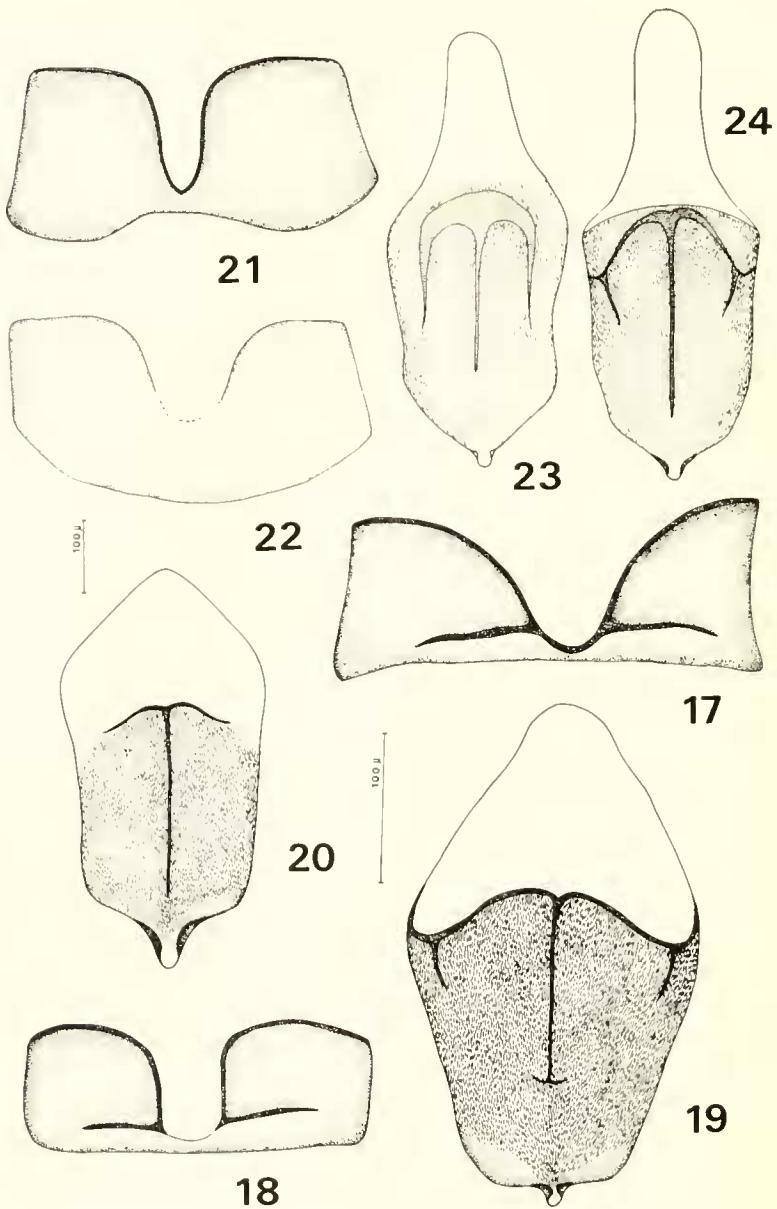
Figs. 8–16, 21, 24

Male.—Wing length 2.6–2.7, 2.66 mm (3); width 1.16 mm (3). Coloration (specimens mounted in Canada balsam) brownish. Head: clypeus dark brownish (Fig. 8), eyes black. Antenna (Fig. 9): scape and pedicel dark brownish, 1st flagellomere light brownish to yellowish, its distal $\frac{1}{3}$ and the 7 intermediate flagellomeres more pigmented, last flagellomere light as the 1st. Thorax dark brownish. Wings yellowish. Legs: coxae, trochanters, and articulations of femora and tibiae dark brownish, the rest yellowish; tibial spurs and claws blackish. Abdominal segments including hypopygium dark brownish. *Head*: Interocular width 173 μm (3), total width 390 μm (3), ocular height 238 μm (3). Antenna: pedicel without setae, 1st



Figs. 8–16. *Clunio chilensis*. 8, Head, frontal view. 9, Antenna. 10, Wing. 11–13, tibial spurs of fore, mid, and hindlegs, respectively. 14, Tarsus of midleg. 15, Tarsus of hindleg. 16, Hypopygium, ventral view.

flagellomere with 2 setae; segments with lengths in proportion of 15:38:8:8:8:8:8:8:8:40. A.R. (11/7–10) 1.19–1.34, 1.26 (3); (11/3–10) 0.42–0.46, 0.43 (3), and (11/4–10) 0.68–0.77, 0.72 (3). Maxillary palpus 55 μm long by 30 μm wide. Clypeus/pedicel ratio 2 (3). *Thorax*: Scutum with 5–7, 6 (3) dorsolateral setae (arising from light ocellate spots) and 5–7, 6 (3) prealar setae. Scutellum with



Figs. 17-24. U-shaped ridge on 8th tergite, 17-18, 21-22; plate of 9th tergite, 19-20, 23-24. 17, 19, *Clunio marshalli*. 18, 20, *C. virginianus*. 21, 24, *C. chilensis*. 22-23, *C. schmitti*.

about 20 setae. All setae 65-80 μm long. *Wing* (Fig. 10): V.R. = 1.11. Wing membrane and squama bare. $R + R_1$ with 5-6 setae, R_{4+5} with 6-7 setae; R_1 $\frac{1}{3}$ the length of R_{4+5} , the latter straight and the same length as R ; M straight, not upcurved, ending as do Cu_1 and Cu_2 before wing margin; fCu broad at base; Cu_2 nearly straight on basal $\frac{1}{2}$, then bending abruptly and bent almost straight back

on distal half, the extreme tip not recurved. A_1 ending beyond level of fCu, A_2 ending at level of fCu. *Legs*: Coxa and trochanter each distally with tuft of 5–10 strong setae on foreleg, those of trochanter arranged in 1 row; each with 4–5 small setae on fore and hindlegs. Femora and tibiae of all legs with sparse rows of strong and long setae, that measure 65–108 μm long, longer on femur of foreleg (130 μm). First tarsomere 4 \times as long as broad on foreleg and 3 \times as long as broad on mid and hindlegs. Length of tibial spurs: on foreleg 32–40, 35 μm (3) (Fig. 11); midleg 35–40, 37 μm (3) (Fig. 12); hindleg 40–60, 48 μm (Fig. 13). Fourth tarsomere of midleg with a protuberance as shown in Fig. 14; 3rd tarsomere of hindleg tri-lobed (Fig. 15). Lengths (μm) and proportions of legs ($n = 3$): Leg I: Fe 534 (499–580); Ti 889 (812–928); Ta1 155 (151–162); Ta2 63 (58–74); Ta3 48 (34–65); Ta4 43 (35–48); Ta5 94 (81–108); L.R. 0.17 (0.16–0.18); B.V. 6.46 (6.43–7.59); S.V. 9.20 (8.83–9.45). Leg II: Fe 634 (626–638); Ti 673 (626–696); Ta1 116; Ta2 46; Ta3 39 (35–46); Ta4 39 (35–46); Ta5 93 (81–104); L.R. 0.16 (0.16–0.18); B.V. 6.60 (6.28–6.94); S.V. 11.26 (10.79–11.5). Leg III: Fe 696 (580–754); Ti 735 (696–754); Ta1 116; Ta2 46; Ta3 81; Ta4 46; Ta5 97 (93–104); L.R. 0.15 (0.15–0.16); B.V. 5.73 (5.23–6.16); S.V. 12.33 (11–13). *Abdomen*: Each tergite with row of setae about 87 μm long. *Hypopygium* (Fig. 16): Gonocoxite length 638–731, 692 μm (3); gonostylus length 232–255, 247 μm (3); H.R. 2.75–2.86, 2.79 (3). Gonocoxites fused on proximal $\frac{1}{3}$. Parameres well sclerotized and slightly curved, almost in vertical position. Plate of 9th tergite short, ovoid, with parallel sides, ending somewhat conically and scarcely reaching level of tips of gonocoxites, with strong pubescence. Gonostylus triangular, densely pubescent on $\frac{2}{3}$ of its surface, lateral margin slightly concave, apically with 2 or 3 small retrorse spine, internal mesal angle rounded, bare, and with a blunt tooth directed anteriorly.

Female and immature stages.—Unknown.

Material examined.—Holotype δ , Pt. Alert, Mornington Island, Chile, 26–27.ix. 1969, O. S. Flint, Jr., col. (deposited in USNM). Paratypes, 2 δ , same data as holotype.

Discussion.—*Clunio chilensis* n. sp. closely resembles *C. schmitti* Stone and Wirth (1947) from the Galapagos Islands, but *schmitti* differs in having the last flagellomere more tapering and densely pitted, wing vein Cu2 straight at base, abruptly bent caudad at midportion and then recurved posterodially towards wing margin, vein M is upcurved towards its apex, and the gonocoxites are fused on proximal $\frac{3}{4}$ of their length. The differences between the species in the appearance of the U-shaped ridge on tergite 8 are shown in Figs. 23–24, and of the median plate of tergite 9 in Figs. 21–22. Both *chilensis* and *schmitti* are separated from *Clunio californiensis* Hashimoto (1974) by having traces of two to three incisions on tarsomere 3 of the hindleg, the tibial spurs of the fore and midlegs well developed, the distinctive U-shaped ridges on tergite 8, and the median plate of tergite 9 distinctly narrowed on the distal half rather than oblong with shield-shaped tip.

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